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New combinations in *Lactifluus*. 1. *L.* subgenera *Edules*, *Lactariopsis*, and *Russulopsis*

A. Verbeken[1*], J. Nuytinck[1] & B. Buyck[2]

[1]*Ghent University, Department of Biology, Research Group Mycology, K.L. Ledeganckstraat 35, B-9000 Gent, Belgium*

[2]*Muséum National d'Histoire Naturelle, Dépt. Systématique et Evolution, CP39,UMR7205, 12 Rue Buffon, F-75005 Paris, France*

*Correspondence to: *mieke.verbeken@ugent.be*

Abstract — In this first of a series of three papers, new combinations in the genus *Lactifluus* are proposed. This paper treats the subgenera *Edules*, *Lactariopsis,* and *Russulopsis* (all proposed here as new combinations in *Lactifluus*). In *Lactifluus* subg. *Edules*, eight combinations at species level are proposed. In *Lactifluus* subg. *Lactariopsis*, the following three new combinations are proposed at sectional level: *Lactifluus* sect. *Lactariopsis* with seven newly combined species, *L.* sect. *Chamaeleontini* with eight newly combined species, and *L.* sect. *Albati* with four newly combined species plus two species previously combined in *Lactifluus*. Finally, in *L.* subg. *Russulopsis*, eight new combinations at species level are proposed.

Key words — milkcaps, nomenclature

Introduction

Multigene-based phylogenies of the *Russulaceae* show that *Lactarius* and *Russula,* described by Persoon in 1797 and 1796 respectively, are not supported as two monophyletic clades (Buyck et al. 2008). *Russula* appears to be monophyletic only when a small group of species (*R.* subsect. *Ochricompactae*) is removed. This small group of species, which forms a clade where *Lactarius* and *Russula* are mixed, was described recently as the new genus *Multifurca* Buyck & V. Hofst. (Buyck et al. 2008).

Apart from the representatives that belong to *Multifurca*, *Lactarius* divides into two clades, a larger and a smaller one, and splitting the genus seems a better solution than lumping everything in a giant genus *Russula.*

In a proposal to conserve *Lactarius* with a conserved type (Buyck et al. 2010), arguments were given to justify the conservation of *Lactarius torminosus*

(Schaeff.: Fr.) Pers. as the type of *Lactarius*. This has the advantage of retaining the name *Lactarius* for the larger clade, so that only the smaller clade (containing 20% of the species) would require new combinations. Since most of the species in the smaller clade are tropical, almost all temperate milkcaps would remain in *Lactarius*.

The subgenera *Lactarius* subg. *Piperites*, *Lactarius* subg. *Russularia*, and *Lactarius* subg. *Plinthogalus* would constitute the larger genus *Lactarius* sensu novo, while the former subgenera *Lactarius* subg. *Lactarius*, *Lactarius* subg. *Lactariopsis*, *Lactarius* subg. *Russulopsis*, *Lactarius* subg. *Lactifluus*, and *Lactarius* subg. *Gerardii*, and the former section *Lactarius* sect. *Edules* would constitute the genus *Lactifluus* (Pers.) Roussel.

The proposal (Buyck et al. 2010) was supported by the Nomenclatural Committee for Fungi (Norvell 2011) and has been approved by the General Committee and accepted by the 2011 International Botanical Congress (Barrie 2011, McNeill et al. 2011). This first paper proposes new combinations in *Lactifluus*, recombinations of species from the subgenera *Lactariopsis* and *Russulopsis,* and the section *Edules.*

Taxonomy

Lactifluus subg. *Edules*

Molecular phylogenies show that *Lactarius* sect. *Edules* is a well-supported, monophyletic clade (Buyck et al. 2008). It is preferable to treat it at the subgenus rank. Currently, this group consists of eight species, all endemic for tropical Africa.

Lactifluus subg. ***Edules*** (Verbeken) Verbeken, **comb. nov.**
MycoBank MB 563158
≡ *Lactarius* section *Edules* Verbeken, Belg. J. Bot. 132: 176. 2000 ("1999").
Type species: *Lactarius edulis* Verbeken & Buyck

Lactifluus aureifolius (Verbeken) Verbeken, **comb. nov.**
MycoBank MB 563150
≡ *Lactarius aureifolius* Verbeken, Bull. Jard. Bot. Belg. 65: 198. 1996.

Lactifluus densifolius (Verbeken & Karhula) Verbeken, **comb. nov.**
MycoBank MB 563151
≡ *Lactarius densifolius* Verbeken & Karhula, Bull. Jard. Bot. Belg. 65: 200. 1996.

Lactifluus edulis (Verbeken & Buyck) Buyck, **comb. nov.**
MycoBank MB 563152
≡ *Lactarius edulis* Verbeken & Buyck, Champ. Comest. Ouest Burundi: 103. 1994.

Lactifluus inversus (Gooss.-Font. & R. Heim) Verbeken, **comb. nov.**
MycoBank MB 563153
≡ *Lactarius inversus* Gooss.-Font. & R. Heim, Bull. Jard. Bot. État 25: 78. 1955.

Lactifluus latifolius (Gooss.-Font. & R. Heim) Verbeken, **comb. nov.**
MycoBank MB 563154
≡ *Lactarius latifolius* Gooss.-Font. & R. Heim, Bull. Jard. Bot. État 25: 82. 1955.

Lactifluus nodosicystidiosus (Verbeken & Buyck) Buyck, **comb. nov.**
MycoBank MB 563155
≡ *Lactarius nodosicystidiosus* Verbeken & Buyck, Mycol. Res. 111: 794. 2007.

Lactifluus phlebophyllus (R. Heim) Buyck, **comb. nov.**
MycoBank MB 563156
≡ *Lactarius phlebophyllus* R. Heim, Candollea 7: 378. 1938.

Lactifluus roseolus (Verbeken) Verbeken, **comb. nov.**
MycoBank MB 563157
≡ *Lactarius roseolus* Verbeken, Bull. Jard. Bot. Belg. 65: 207. 1996.

Lactifluus subg. *Lactariopsis*

Three sections are recognized in this subgenus. One, *L.* sect. *Lactariopsis*, is characterized by species with a distinct veil resulting from pseudoangiocarpic development (Heim 1937) and is known only in tropical Africa and South America. *Lactifluus* sect. *Chamaeleontini* also has its major distribution in tropical Africa but contains some Asian species. *Lactifluus* sect. *Albati* is mainly temperate with representatives from North America and Europe, but some Asian species are also placed in this group. The molecular analyses contradict the monophyly of *L.* subgenus *Lactariopsis*. *Lactifluus* sect. *Albati* is an evolutionarily distinct group that is not closely related to *L.* sect. *Lactariopsis* and *L.* sect. *Chamaeleontini*. The monophyly of both latter sections remains to be further investigated. We provisionally maintain the traditional division of *L.* subg. *Lactariopsis* in three sections here for practical reasons.

Lactifluus subg. ***Lactariopsis*** (Henn.) Verbeken, **comb. nov.**
MycoBank MB 563214
≡ *Lactariopsis* Henn., Bot. Jahrb. Syst. 30: 51. 1901.
≡ *Lactarius* sect. *Lactariopsis* (Henn.) Singer, Ann. Mycol 40: 111. 1942 (as "*Lactariopsideae*").
≡ *Lactarius* subg. *Lactariopsis* (Henn.) R. Heim, Prodr. Fl. Mycologique Madagascar 1: 36. 1938.
Type species: *Lactariopsis zenkeri* Henn.

Lactifluus sect. ***Lactariopsis*** Verbeken, **sect. nov.**
MycoBank MB 563215
Velum praesens distinctumque, annulum formans. Pileipellis et stipitipellis cum pilis crassiparietini abundantes. Pseudopleurocystidia abundantia, fusiformia, emergentia.
Type species: *Lactariopsis zenkeri* Henn.

Lactifluus annulatoangustifolius (Beeli) Buyck, **comb. nov.**
MycoBank MB 563170
≡ *Russula annulatoangustifolia* Beeli, Bull. Jard. Bot. État 14: 87. 1936.
≡ *Lactarius annulatoangustifolius* (Beeli) Buyck, Bull. Jard. Bot. Belg. 59: 241. 1989.

Lactifluus annulifer (Singer) Nuytinck, **comb. nov.**
MycoBank MB 563171
≡ *Lactarius annulifer* Singer, Beih. Nova Hedwigia 77: 290. 1983.

Lactifluus heimii (Verbeken) Verbeken, **comb. nov.**
MycoBank MB 563172
≡ *Lactarius heimii* Verbeken, Bull. Jard. Bot. Belg. 65: 201. 1996.

Lactifluus neotropicus (Singer) Nuytinck, **comb. nov.**
MycoBank MB 563173
≡ *Lactarius neotropicus* Singer, Kew Bull. 7: 299. 1952.

Lactifluus pelliculatus (Beeli) Buyck, **comb. nov.**
MycoBank MB 563174
≡ *Armillaria pelliculata* Beeli, Bull. Soc. Roy. Bot. Belgique 59: 111. 1927.
≡ *Lactarius pelliculatus* (Beeli) Buyck, Bull. Jard. Bot. Belg. 59: 142. 1989.

Lactifluus velutissimus (Verbeken) Verbeken, **comb. nov.**
MycoBank MB 563175
≡ *Lactarius velutissimus* Verbeken, Bull. Jard. Bot. Belg. 65: 212. 1996.

Lactifluus zenkeri (Henn.) Verbeken, **comb. nov.**
MycoBank MB 563176
≡ *Lactariopsis zenkeri* Henn., Bot. Jahrb. Syst. 30: 51. 1902 ("1901").
≡ *Lactarius zenkeri* (Henn.) Singer, Ann. Mycol. 40: 111. 1942.

Lactifluus sect. ***Chamaeleontini*** (Verbeken) Verbeken, **comb. nov.**
MycoBank MB 563216
≡ *Lactarius* section *Chamaeleontini* Verbeken, Mycotaxon 66: 393. 1998.
Type species: *Lactarius chamaeleontinus* R. Heim

Lactifluus chamaeleontinus (R. Heim) Verbeken, **comb. nov.**
MycoBank MB 563217
≡ *Lactarius chamaeleontinus* R. Heim, Bull. Jard. Bot. État 25: 87. 1955.

Lactifluus emergens (Verbeken) Verbeken, **comb. nov.**
MycoBank MB 563218
≡ *Lactarius emergens* Verbeken, Syst. Geogr. Pl. 70(1): 192. 2000.

Lactifluus indusiatus (Verbeken) Verbeken, **comb. nov.**
MycoBank MB 563219
≡ *Lactarius indusiatus* Verbeken, Bull. Jard. Bot. Belg. 65: 201. 1996.

Lactifluus laevigatus (Verbeken) Verbeken, **comb. nov.**
MycoBank MB 563220
≡ *Lactarius laevigatus* Verbeken, Bull. Jard. Bot. Belg. 65: 203. 1996.

Lactifluus leoninus (Verbeken & E. Horak) Verbeken, **comb. nov.**
MycoBank MB 563221
≡ *Lactarius leoninus* Verbeken & E. Horak, Austr. Syst. Bot. 12: 775. 1999.

Lactifluus madagascariensis (Verbeken & Buyck) Buyck, **comb. nov.**
MycoBank MB 563222
≡ *Lactarius madagascariensis* Verbeken & Buyck, Mycol. Res. 111: 791. 2007.

Lactifluus pruinatus (Verbeken & Buyck) Verbeken, **comb. nov.**
MycoBank MB 563223
≡ *Lactarius pruinatus* Verbeken & Buyck, Mycotaxon 66: 399. 1998.

Lactifluus sesemotani (Beeli) Buyck, **comb. nov.**
MycoBank MB 563224
≡ *Russula sesemotani* Beeli, Bull. Soc. Roy. Bot. Belgique 60(2): 169. 1928.
≡ *Lactarius sesemotani* (Beeli) Buyck, Bull. Jard. Bot. Belg. 59: 241. 1989.

Lactifluus sect. ***Albati*** (Bataille) Verbeken, **comb. nov.**
MycoBank MB 563735
≡ *Lactarius* [unranked] *Albati* Bataille, Fl. Monogr. Astéro.: 35. 1908.
≡ *Lactarius* subsect. *Albati* (Bataille) Konrad, Bull. Soc. Mycol. France 51: 188. 1935.
≡ *Lactarius* sect. *Albati* (Bataille) Singer, Ann. Mycol 40: 109. 1942.
Type species: *Agaricus vellereus* Fr. : Fr.

Lactifluus bertillonii (Neuhoff ex Z. Schaef.) Verbeken, **comb. nov.**
MycoBank MB 563226
≡ *Lactarius vellereus* var. *bertillonii* Neuhoff ex Z. Schaef., Česká Mykol. 33: 9. 1979.
≡ *Lactarius bertillonii* (Neuhoff ex Z. Schaef.) Bon, Doc. Mycol. 10(37–38): 92. 1980 ("1979").

Lactifluus deceptivus (Peck) Kuntze, Revis. Gen. Pl. 2: 856. 1891.
≡ *Lactarius deceptivus* Peck, Annual Rep. New York State Mus. 38: 125. 1885.

Lactifluus pilosus (Verbeken, H.T. Le & Lumyong) Verbeken, **comb. nov.**
MycoBank MB 563227
≡ *Lactarius pilosus* Verbeken, H.T. Le & Lumyong, Mycotaxon 102: 287. 2007.

Lactifluus puberulus (H.A. Wen & J.Z. Ying) Nuytinck, **comb. nov.**
MycoBank MB 563228
≡ *Lactarius puberulus* H.A. Wen & J.Z. Ying, Mycosystema 24(2): 155. 2005.

Lactifluus subvellereus (Peck) Nuytinck, **comb. nov.**
MycoBank MB 563229
≡ *Lactarius subvellereus* Peck, Bull. Torrey Bot. Club 25: 369. 1898.

Lactifluus vellereus (Fr. : Fr.) Kuntze, Revis. Gen. Pl. 2: 857. 1891.
≡ *Agaricus vellereus* Fr. : Fr., Syst. Mycol. 1: 76. 1821.
≡ *Lactarius vellereus* (Fr. : Fr.) Fr., Epicr. Syst. Mycol.: 340. 1838.

Lactifluus subg. *Russulopsis*

Currently, this group comprises eight species, all endemic for tropical Africa. All species are recombined in the genus *Lactifluus* here.

Lactifluus subg. ***Russulopsis*** (Verbeken) Verbeken, **comb. nov.**
MycoBank MB 563736
≡ *Lactarius* subg. *Russulopsis* Verbeken, Mycotaxon 77: 439. 2001.
Type species: *Lactarius ruvubuensis* Verbeken

Lactifluus sect. ***Russulopsidei*** (Verbeken) Verbeken, **comb. nov.**
MycoBank MB 563737
≡ *Lactarius* sect. *Russulopsidei* Verbeken, Mycotaxon 77: 440. 2001.
Type species: *Lactarius ruvubuensis* Verbeken

Lactifluus brachystegiae (Verbeken & C. Sharp) Verbeken, **comb. nov.**
MycoBank MB 563230
≡ *Lactarius brachystegiae* Verbeken & C. Sharp, Syst. Geogr. Pl. 70(1): 187. 2000.

Lactifluus claricolor (R. Heim) Verbeken, **comb. nov.**
MycoBank MB 563231
≡ *Lactarius claricolor* R. Heim, Candollea 7: 381. 1938.

Lactifluus corbula (R. Heim & Gooss.-Font.) Verbeken, **comb. nov.**
MycoBank MB 563232
≡ *Lactarius corbula* R. Heim & Gooss.-Font., Bull. Jard. Bot. État 25: 64. 1955.

Lactifluus cyanovirescens (Verbeken) Verbeken, **comb. nov.**
MycoBank MB 563233
≡ *Lactarius cyanovirescens* Verbeken, Bull. Jard. Bot. Belg. 65: 199. 1996.

Lactifluus longipes (Verbeken) Verbeken, **comb. nov.**
MycoBank MB 563234
≡ *Lactarius longipes* Verbeken, Bull. Jard. Bot. Belg. 65: 203. 1996.

Lactifluus pseudotorminosus (R. Heim) Verbeken, **comb. nov.**
MycoBank MB 563235
≡ *Lactarius pseudotorminosus* R. Heim, Candollea 7: 379. 1938.

Lactifluus ruvubuensis (Verbeken) Verbeken, **comb. nov.**
MycoBank MB 563236
≡ *Lactarius ruvubuensis* Verbeken, Bull. Jard. Bot. Belg. 65: 208. 1996.

Lactifluus urens (Verbeken) Verbeken, **comb. nov.**
MycoBank MB 563237
≡ *Lactarius urens* Verbeken, Bull. Jard. Bot. Belg. 65: 211. 1996.

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